Field-Portable Fentanyl Detection Instruments and Assays: Reference Data Collection and Performance

Science and Technology

CHALLENGE: CHEMICAL IDENTIFICATION OF UNKNOWN SUBSTANCES IN THE FIELD

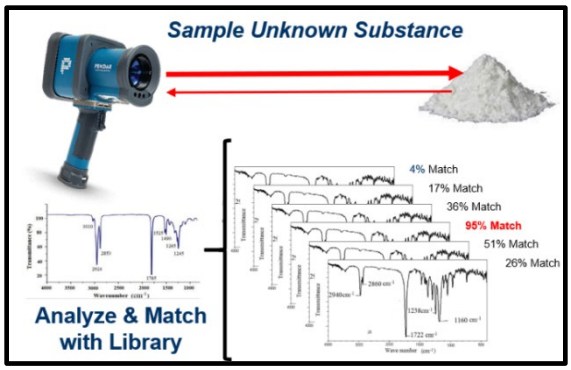
Department of Homeland Security (DHS) Components and first responders face a significant challenge from the growing presence of uncharacterized narcotic substances encountered in the field, as they seek to interdict illicit drugs trafficked throughout the United States. Modifications to the molecular structure of fentanyl, or other opioids, generates novel synthetic opioids that can be 100 times more potent than fentanyl. Due to the hazardous and illicit nature of these substances, vendors of field-portable detection equipment are often unable to obtain these substances for characterization and inclusion in detection systems. As a result, vendors struggle to keep pace with emerging substances in the field, putting first responders and federal agents who rely on detection systems at risk of unknowingly encountering hazardous substances.

SOLUTION: NEW REFERENCE LIBRARIES FOR EMERGING ILLICIT DRUGS

The DHS Science and Technology Directorate's (S&T) Opioid/Fentanyl Detection Program, in collaboration with the S&T Office of Standards, is funding the Pacific Northwest National Laboratory (PNNL) to build spectral reference libraries of approximately 50 Drug Enforcement Administration (DEA) restricted substances. including fentanyl, fentanyl analogues, and other emerging illicit drugs. Through Cooperative Research and Development Agreements (CRADAs) with industry partners, PNNL will collect reference spectra on 20 different field portable detectors currently deployed for operational use. These instruments include six different detection technologies: gas chromatography/mass spectrometry, high pressure mass spectrometry, ion mobility spectrometry, Raman spectroscopy, Fourier-transform infrared spectroscopy, and fluorescence quenching techniques. Once the instruments have been equipped with fully upgraded spectral libraries, PNNL will conduct a thorough performance assessment and publish the results in a public report.

BETTER TECHNOLOGY, BETTER PROTECTION

This effort will have a positive impact on first responder communities, vendors, and the government. Through this



effort, DHS will provide vendors with access to restricted chemicals to help enhance their instruments' capabilities. DHS will maintain ownership of the newly generated reference libraries, which will be provided as a free upgrade to any tribal, local, state, or federal agency that currently uses these technologies. Sharing the libraries will result in more robust detection capabilities and better protection for users in the field. Furthermore, the performance assessment report on instruments with upgraded libraries will help inform DHS Component and first responder procurement decisions and increase confidence in detector results.

ACCOMPLISHMENTS TO DATE

- (Fiscal Year 2021 Quarter 1) Published Request for Information (RFI) to solicit interest from instrument vendors.
- (FY21 Q3) PNNL obtained DEA approval to import carfentanil, in addition to procuring all other substances for data collection and testing.
- (FY21 Q4) CRADAs executed with vendors participating in reference library collection.

UPCOMING MILESTONES

- (FY22 Q1) Collect baseline reference spectra on all 20 instruments involved in this effort.
- (FY23 Q2) Complete data collection on instruments with upgraded libraries.
- (FY23 Q4) Publish a final report detailing the performance of the detection systems.

PARTNERS

- PNNL, Richland, WA
- S&T Office of Standards, Washington, DC